

APPLICATION FOR UNITED STATES LETTERS PATENT

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TITLE: CONVEYING AND REMOVING OF ROD-
ARTICLES IN THE TOBACCO-PROCESSING
INDUSTRY

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CROSS-REFERENCE TO RELATED APPLICATION

0001 This application claims the priority of European Patent Application Serial No. 02 020 640.5, filed on September 13, 2002, the subject matter of which, together with each and every U.S. and foreign Patent and Patent Application mentioned herein, is incorporated herein by reference.

BACKGROUND OF THE INVENTION

0002 The invention relates to a method for conveying rod-shaped articles in the tobacco-processing industry, in particular cigarettes, wherein the articles are held with a holding vacuum on a conveying drum and wherein an article to be removed is transferred in a transfer region to a removal drum. The invention furthermore relates to an apparatus for conveying rod-shaped articles in the tobacco-processing industry, in particular cigarettes, comprising at least one conveying drum and one removal drum which can respectively be admitted with a vacuum for holding the articles.

0003 The invention also relates to a machine in the tobacco-processing industry, in particular a filter-attachment machine.

0004 In connection with the present case, rod-shaped articles in the tobacco-processing industry are understood to be objects held with suction air in a single-layer row on conveyors, i.e. conveying drums in cigarette-production machines, which are conveyed by these conveyors. Articles of this type are filter cigarettes, cigars, cigarillos, filter rods etc. If in the following reference is made only to cigarettes for the sake of simplicity, such reference applies equally to other articles of the aforementioned type, which are to be conveyed.

0005 In a cigarette production machine, suction air is used to hold cigarettes in a single-layer row and transverse to their axial orientation on conveying drums, primarily drums on cigarette production machines and/or filter-attachment machines. For this, the circumferential surface of the conveying drums is provided with suction air openings that are connected to a vacuum source. The transfer of cigarettes from a first conveyor to the

following conveyor as a rule occurs by interrupting the holding air supplied to the respectively first, releasing conveyor in the transition region while the holding air for the respectively second, receiving conveyor is turned on. For a normal transfer from one conveying drum to the following drum, fixed control sections are arranged on the inside of the circumferential area of the conveyor that forms the transfer region and are used to interrupt the holding air. These control sections cover the suction air openings in this area of the conveyor, thus cutting off the vacuum pressure.

0006 Research Disclosure 17011 of June 1978, describes an apparatus for carefully separating out rod-shaped articles in the tobacco-processing industry, wherein a controllable compressed-air supply is assigned to a conveyor in a transfer region. An article to be separated out can thus be transferred with the aid of a compressed-air surge from a receptacle in the conveying conveyor to a receptacle in the removing conveyor. The first conveyor is provided with a reducing valve in the area of transition, which is designed for reducing the holding vacuum, so that a cigarette is blown out of the

releasing drum with compressed air and counter to the reduced vacuum pressure in the holding bores.

0007 U.S. Patent 4 452 255, co-owned by the Assignee of the present application, discloses the transfer of cigarettes from one drum to the following drum, wherein the holding vacuum on the first drum is turned off for the cigarette transfer. If a defective cigarette or a sample cigarette is to remain on the first drum, compressed air is blown from the receiving trough to the releasing trough and the holding vacuum in the releasing trough is thus reduced. At the same time, compressed air is supplied by the same compressed-air source to an injector, which creates a vacuum pressure in the releasing trough of the first drum, so that the cigarette remains inside the releasing trough during the continued conveying.

0008 The transfer of cigarettes from a trough conveyor to a sample removal drum is described in European Patent EP-B-0 584 774. In that case, the vacuum pressure at the receiving trough in the sample removal drum is higher than the vacuum pressure at the releasing trough in the drum conveyor.

0009 The disadvantage when removing a cigarette from the production stream is that compressed air is blown against the cigarette to be removed, so that the cigarette is accelerated by the compressed air and flies from the releasing trough to land in the receiving trough of the removal drum. This type of removal is hard to adjust and can be adjusted only for a predetermined drum speed. In addition, the cigarette is subjected to heavy mechanical stress and, in some circumstances, is deformed, so that it will not pass the subsequent quality control.

SUMMARY OF THE INVENTION

00010 It is an object of the present invention to make possible a careful transfer during the removal of cigarettes from the production flow.

00011 The above and other objects are achieved according to the invention with a method for conveying rod-shaped articles in the tobacco-processing industry, comprising: holding the articles on a conveying drum with the aid of a holding vacuum; transferring the respective articles in a transfer region from the conveying drum to a removal drum, including stopping the holding vacuum at the

conveying drum for removal of the article from the conveying drum and supplying a holding vacuum to the removal drum.

00012 The invention is based on the idea that the holding vacuum at the conveying drum is compensated during the transfer of a cigarette to a removal drum, thus permitting a careful cigarette removal from the running production, i.e. as a sample. In an exemplary embodiment, at the transfer point and/or in the transfer region, suction air is supplied to the respective receiving trough for a cigarette. For the removal of a cigarette sample, the holding vacuum that still exists is compensated, so that the cigarette is no longer held inside the receiving trough.

00013 According to one modification of the invention, the holding vacuum at the removal drum is stopped if no object is removed, so that the cigarettes remain on the conveying drum. The careful removal of a cigarette is possible if a holding vacuum is applied to the receiving trough in the removal drum and the holding vacuum compensation is simultaneously turned off. On the whole, this permits a careful transfer of cigarettes to a

removal drum. For example, a holding vacuum is applied to the removal drum during normal operations when no cigarette is removed, but this holding vacuum is compensated and/or will be compensated.

00014 The holding vacuum to the removal drum and the conveying drum is preferably compensated with the aid of compressed air, in particular a pressure surge.

00015 According to one advantageous embodiment of the invention, the compressed air is supplied either to the removal drum or the conveying drum. As a result of the optional compensation of the vacuum that is applied to the drums, the supplied holding vacuum can respectively be canceled depending on the operating mode, meaning the removal and/or non-removal of cigarettes. As a result, only one compressed-air source is required which is connected to the removal drum or the conveying drum, depending on the operating mode.

00016 In addition, the articles are admitted with a holding vacuum via suction bores in the conveying drum or via suction bores in the removal drum.

00017 It is particularly advantageous if the holding vacuum applied to a single receptacle for an article is stopped.

As a result, compressed air is always supplied for exactly one transfer operation. The cigarette in the transfer region is either held on the conveying drum or is transferred to the removal drum.

00018 The object is furthermore solved for an apparatus of the aforementioned type in that for the removal of an article from the conveying drum with the aid of the removal drum, means are provided for stopping the holding vacuum at the conveying drum.

00019 According to a preferred modification of the invention, the holding vacuum at the removal drum can be stopped if no articles are removed.

00020 In particular, the holding vacuum can be stopped with the aid of compressed air, especially a compressed air surge.

00021 The compressed air furthermore can be supplied either to the removal drum or to the conveying drum.

00022 To hold and transport cigarettes and the like, the conveying drum and/or the removal drum is provided with suction bores for applying the holding vacuum.

00023 It is furthermore possible with the apparatus according to the invention to stop the holding vacuum for

a single article receptacle in the conveying drum or the removal drum.

00024 A compressed-air source is provided for compensating the holding vacuum applied to the drums.

00025 In addition, a valve is provided for the compressed-air source for optionally connecting the compressed-air source either to the conveying drum or the removal drum.

00026 According to a further aspect of the invention, there is provided a filter-attachment machine tobacco processing industry which is designed according to the invention with an apparatus as described in the above.

BRIEF DESCRIPTION OF THE DRAWINGS

00027 The invention is described with the aid of an exemplary embodiment shown in the drawings and without restricting the general inventive idea, wherein the drawings are expressly referred to for all details not explained further in the text.

00028 Figure 1 shows a cross-sectional detail of a drum arrangement for the situation in which no articles are removed.

00029 Figure 2 shows a cross-sectional detail of a drum arrangement for the situation in which articles are removed.

DETAILED DESCRIPTION OF THE INVENTION

00030 Identical elements are provided with the same reference numbers in the following drawings and will not be introduced again.

00031 Figures 1 and 2 respectively show cross-sectional details of the same drum arrangement, consisting of a conveying drum 2 and a removal drum 3.

00032 The conveying drum 2 is provided with suction bores 6 on its outer circumferential surface, to which suction air is applied so that the cigarettes 4 rest inside the receiving troughs of the conveying drum 2 and are held therein. The conveying drum 2 moves the cigarettes 4 to a transition region 5 where respectively one cigarette 4 is removed with the aid of the removal drum 3. The removal drum 3 is also provided with receiving troughs on its circumferential surface, to which suction air can be applied via suction bores 7.

00033 A portion of a control member 8 is arranged inside the conveying drum 2, in the transition region 5. The locally fixed control member 8 has a bore 10 to which suction air is continuously applied. The bore 10 is furthermore connected via a connecting piece 11 to a channel 12, which can be connected via a line 13 and a reversing valve 15 to a compressed-air source (not shown herein).

00034 A section of a control member 9 is arranged inside the removal drum 3. The control member 9 additionally contains a bore 16 in the transition region 5, which is connected via a connecting piece 17 to a channel 18. The channel 18 can be supplied via a line 14 with compressed air and can be connected to a compressed air source by switching the valve 15 accordingly (Figure 1).

00035 Figure 1 shows the case where no cigarette 4 is removed from the conveying drum 2 while Figure 2 shows the case where a cigarette is removed.

00036 Suction air is applied to bores 10 and/or 16 of the drums 2 and/or 3 during the operation, wherein the holding vacuum at the bore 16 is compensated with compressed air from the compressed air source via the

valve 15, the line 14, the channel 18 and the connecting piece 17 if no article is removed. In that case, the cigarettes 4 remain on the conveying drum 2 (Figure 1).

00037 The valve 15 is reversed for removing a random sample, so that the compressed air supplied to the bore 10 can compensate the holding vacuum. The reversal of valve 15 causes a pressure surge, which compensates the holding vacuum at the bore 10 and the cigarette 4 is no longer held against the drum 2. At the same time, the holding vacuum compensation at the bore 16 of drum 3 is stopped and/or turned off, so that the cigarette 4 is transferred to the removal drum 3. Following the transfer, the valve 15 is switched back to its starting position (Figure 1).

00038 The subject matter of the invention results in a careful transfer and handling of the cigarettes since the cigarettes are removed carefully and are not pulled counter to the vacuum pressure resistance from the troughs of the conveying drum, which results in deformation. In addition, it is not necessary to switch on a vacuum for transferring the cigarette.

00039 The invention has been described in detail with respect to preferred embodiments, and it will now be apparent from

the foregoing to those skilled in the art, that changes and modifications may be made without departing from the invention in its broader aspects, and the invention, therefore, as defined in the appended claims, is intended to cover all such changes and modifications that fall within the true spirit of the invention.